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Residual ANODE

Monday 13 May 2024 14:30 (15 minutes)

We present R-Anode, a new method for data-driven, model-agnostic resonant anomaly detection that raises the bar for both performance and interpretability. The key to R-Anode is to enhance the inductive bias of the anomaly detection task by fitting a normalizing flow directly to the small and unknown signal component, while holding fixed a background model (also a normalizing flow) learned from sidebands. In doing so, R-Anode is able to outperform all classifier-based, weakly-supervised approaches, as well as the previous Anode method which fit a density estimator to all of the data in the signal region instead of just the signal. We show that the method works equally well whether the unknown signal fraction is learned or fixed, and is even robust to signal fraction misspecification. Finally, with the learned signal model we can sample and gain qualitative insights into the underlying anomaly, which greatly enhances the interpretability of resonant anomaly detection and offers the possibility of simultaneously discovering and characterizing the new physics that could be hiding in the data.

Mini Symposia (Invited Talks Only)

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